Dry season refuges for survival in Africa

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Les huits années d'études dans l'est des régions montagneuses du Zimbabwe, et les 16 années précédentes d'études au Malawi, donnent d'importantes mais non quantifiables, évidences que beaucoup d'espèces d'Afrotropicales passerines font de réguliers ou érratiques mouvements en réponse aux conditions crées par les saisons sèches. Si un prolongement de la sècheresse avait lieu, ces sites de saisons sèches feraient d'importants refuges pour beaucoup de passerines. L'étude de genre *Nectarinia* indique que les oiseaux adultes sont plus adaptés pour survivre dans ces conditions. Quelques espèces de petites passerines d'afrique auraient une espérance de vie plus lonque que leurs espèces similaire vivant en Europe, mais plus d'informations serait à exigér.

For 16 years, I ringed birds in the lower Shire valley of Malawi, at 60 m asl and c450 km by river from the sea. The land was flat and marshy, but had been partially drained so that not only the sugar cane fields, but also the factory and staff houses, were only just above water-level; during the rainy season the area often became very wet.

My trapping area, of 3–4 ha, consisted of a variety of habitats: a pond with *Typha* bullrushes, lawns and shrubs, dense mixed moist woodland, grassland with *Acacia* / *Combretum* thicket and a few baobabs *Adansonia digitata* and, reaching the river, a saltmarsh with *Phragmites* reeds and some bushes. With eight nets set in different habitats, I caught birds every day throughout the year; annual totals were in excess of 2,500 individuals.

When writing up my data, I found a pattern of occurrence in many species other than known Palearctic or Afrotropical migrants, and surmised that even African resident species had a tendency to move at least a short distance between breeding and wintering quarters.

During those 16 years, there were droughts or summers with low rainfall, but as I did not keep a weather book, I made no connection between climate and bird movements. This is unfortunate, because, with hindsight, a relationship between captures and weather patterns may have been discernible.

Sunbird studies

In 1989, I moved to the eastern highlands of Zimbabwe and a hillside covered in miombo woodland (*Brachystegia / Julbernardia* and associated species), at 1,200 m in the western rainshadow of the Bvumba Mountains. It was evident from the start that trapping in miombo would not produce large number of birds, but I usually caught a few each weekend, even in winter. Having been asked to elucidate sunbird movements, I started regular monthly trapping at two botanical gardens at 1,200 and 1,550 m, with riverine or montane forest and apparently permanent water, as well as much sunbird food.

Over 1,000 sunbirds were caught over the next 18 months, as well as c600 birds of other genera. Then came the worst drought in living memory. The summer of 1991–1992 was almost completely dry and following years little wetter; normal rain did not resume until mid-January 1996. Surprisingly, catch totals at the botanic gardens increased until late 1994, although there appeared to be fewer birds present. I still caught 1,000 birds in 1995. In contrast, at my home—Mitsasa—where the garden and woodland resembled a desert, the only birds were a few doves and small seed-eaters taking advantage of my seed tray and bird bath.

Once the rains returned, I assumed that bird numbers at the sunbird sites would increase, which they did at first. However, numbers subsequently decreased and, now (July 1998), monthly trapping totals are well below those of the first three drought years, despite two successful breeding seasons (judging by the number of juveniles caught). In contrast, some species (particularly small seed-eaters) which disappeared during the drought, have now returned.

During the drought, I started regular trapping at Mountain Home (1,460 m), a private garden on a steep border hillside where there were many proteas and aloes, as well as permanent water. Here, too, we caught large numbers of birds until spring 1996, but now rarely catch 20 birds at each trapping session. Unfortunately much of the protea had died by the end of the drought which must have had an effect on sunbird numbers, but would not explain the reduction in numbers of other genera.

Mitsasa was gradually repopulated and among the birds which appeared were some colour-ringed ones not seen for several years. They must have spent the drought years in an area which retained sufficient

food and water for the survival of at least a few birds, perhaps near the dam 2 km away in the valley, as this did not completely dry up.

Results

In July 1997 I collated my data for all sites, finding 26 birds, ringed before the drought, which had been recaught five or more years later; all but two had been adult when the drought started. Only 14% of those known to be five or more years old had been ringed when under a year old, whereas in Malawi, 32% of those known to be seven or more years old, had been ringed when immature. The drought has had an effect on immature survival in the eastern highlands of Zimbabwe, yet some had survived, although adults had survived the drought more successfully.

During the first 2–3 years of the drought, considerable bird movement was noted in the Mutare area, with many species appearing which do not normally occur there. This appeared to indicate that birds were moving in search of better conditions. No such movement was noticed during the final two years of the drought; presumably by then birds had either found a suitable place in which to survive, or had died. Some of the 'vagrants' remained in Mutare and were seen regularly until the drought ended, but since then there have been no reports of unusual species in the area.

The high trapping totals at the botanic gardens and Mountain Home during the drought produced a high recapture rate, with many birds being recaught frequently until spring 1996. Thereafter, with weather conditions back to normal, the recapture rate has decreased and few of the regulars have been seen again. This suggests that the overall reduction in numbers at these sites is due to many birds having left, in order to return to their usual sites which they inhabited before the drought.

Mountain Home and Bvumba Botanical Garden, with permanent water, and La Rochelle Botanical Garden, where the stream and dam dried up, but limited water from a bore hole kept plants and shrubs green and flowering, provided food for many species and must have attracted birds from surrounding dry areas. These birds would have departed when conditions elsewhere improved.

From my trapping data it appears that, among small birds (under 60–70g), insectivores and omnivores have the best survival rate in both southern Malawi and the eastern highlands of Zimbabwe, with some very tiny (7–12g) warblers and sunbirds being able to live for at least nine years. It also appears that, in general, small African birds may live longer than similar-sized European species. Dr W Peach (UK) is presently working through my Malawi data to determine survival rates and has obtained some surprisingly high figures for several species, relative to known survival rates in European birds. This study is incomplete and I therefore cannot supply further details.

Dry season refuges

Why should African birds live longer than their European counterparts? The European winter is such that many birds head for Africa after breeding and long migratory flights must reduce life expectancy, whereas residents have to contend with snow and harsh weather, but Africa also does not have an equable climate.

Resident southern and central African birds have to contend with a long dry period each year and, in Zimbabwe and Malawi, this usually commences in April–May and continues until October or even December; from October temperatures reach over 40°C. Food and water supplies must be affected by the regular winter and early summer drought, so African birds must have a strategy to deal with this if they are to survive.

I believe that the key to this strategy is movement. Off-season migration by Palearctic and Afrotropical birds is well known and my Malawi studies suggested that off-season movement occurs in many resident African species. Palearctic migrants, eg Great Reed *Acrocephalus arundinaceus* and Garden Warblers *Sylvia borin* travel to a specific area (often the same clump of bushes) each winter and return to Europe to breed in the area in which they hatched. I see no reason why African birds cannot also learn where there is a suitable place in which to wait for conditions appropriate for their return to breeding areas. Adults would know where they spent previous winters, whereas immature birds would have to search for a suitable place and perhaps not find one, which would account for apparently high immature mortality; I ring 100s of young sunbirds each year in February–June, but recapture very few in following years, even under normal conditions.

If African birds tend to move after breeding (immatures at random and adults with purpose), to areas with permanent water (and hence food) in which to spend the dry season, then at least the majority of adults, which are the important group in terms of species survival, should breed again. Random movement by young birds should permit the discovery of new dry season havens. Should drought occur, birds would react in the same way and probably remain in the refuge until conditions improved. Such behaviour would lead to the survival of at least some individuals. If the drought were of long dura-

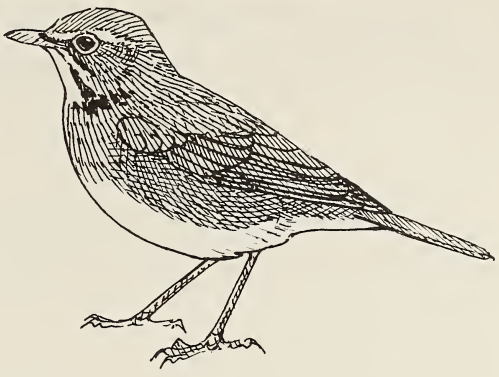
tion, some normally suitable refuges would dry up and become untenable, leading to random movement by all affected birds, as was seen in Mutare in 1992–1993, when species such as Collared Palm-Thrush *Cichladusa arquata*, Narina Trogon *Apaloderma narina* and Violet-eared Waxbill *Uraeginthus granatinus* took up residence in surburban gardens.

Under normal conditions, the off-season movement need not be over great distance, perhaps only a few kilometres to the nearest well-vegetated riverbed. In general the movement would be downstream (altitudinal migration is known to occur in some upland breeding species), as at lower altitudes it is warmer during the winter and rivers are more likely to be permanent. I suspect that the lower Shire valley was an off-season refuge for birds from Malawi's highlands, with individuals of many species returning regularly to moult before departing at the start of the next breeding season.

In eastern Zimbabwe some movement toward the border mountains may occur, as the headwaters of the west or south-flowing streams that join the Sabi River tend to be more permanently watered and vegetated than the relatively open savannah to the west. During the drought it appeared that many birds moved upslope to cooler areas, as some species, normally found at slightly lower altitudes, were caught at 1,460–1,550 m and have since disappeared from the trapping sites. Such movement was probably random, as I consider it unlikely to have been a normal dry-season migration, as these species were not caught in previous or subsequent winters, but a movement toward the base of the mountains, eg to La Rochelle, could be normal.

Unfortunately, there is no real evidence from recaptures or recoveries in Zimbabwe to indicate where birds go during dry season or drought. An adult female Miombo Double-collared Sunbird *Nectarinia manoensis*, ringed at La Rochelle (at the base of a low section of border hills) in July 1990 (the first occasion on which I trapped there) and recaught there twice the following year in May–June, was recovered c25 km to the west in October 1991. In May 1991, it had just completed moult. Most breeding occurs in August–November. Perhaps it regularly wintered at La Rochelle and had just returned to its breeding area when it was killed?

A young Kurrichane Thrush *Turdus libonyanus*, hatched in cOctober 1990 and ringed at La Rochelle two months later, was recovered 61 km away in Mozambique, on the bank of the Pungwe River, after (apparently) colliding with a baobab on 1 January 1996. It is possible that it crossed the low hills east of



Kurrichane Thrush *Turdus libonyanus* by Mark Andrews

La Rochelle to winter in the warm, well-vegetated Pungwe valley, where there is permanent water. I do not know if it returned to Zimbabwe the following spring, but after summer 1991–1992 no thrushes were seen at La Rochelle until spring 1996.

It appears probable that the thrush spent the drought in the Pungwe valley, whether or not it would have returned to Zimbabwe when conditions improved is also unknown. Unfortunately this species' movements in Zimbabwe require elucidation: at Mitsasa my colour-ringed birds perform undescribed movements, being replaced by unringed birds for a while, before returning several months later, but, under normal conditions, I do have Kurrichane Thrushes in the garden year-round.

I cannot presently examine my Zimbabwe data for occurrence patterns, because, of the eight years during which I have been trapping, only the first year and last 18 months were truly 'normal'. Provided there is no drought in the next 2–4 years and if there is an improvement in the recovery rate (currently almost nil), then it may be possible to demonstrate that birds do move in and out of the trapping areas at different seasons.

Proof of the regular use of dry-season refuges is lacking, but surely must occur. The requirements are available water and relatively thick, mixed vegetation (normally found along watercourses), probably at a relatively low altitude, although, during droughts, birds living nearby would probably utilise stream headwaters in the mountains. Therefore, whilst adequate protection of breeding area habitats is important; areas suitable for dry season use also need protection, especially as the true habits of the species to be protected are unknown.

This involves the prevention of fires, bush clearance and cultivation in marshes and along stream and river banks, both in lowlands and at higher altitude.

However, a law preventing stream bank cultivation in Zimbabwe (and other African countries) is seldom enforced as the need for food and water by people and their livestock means that wetlands and river banks are usually the first areas to be stripped of natural vegetation, especially during droughts.

Nevertheless, the effective conservation of Africa's streams and marshes is not only a prerequisite for clean, healthy rivers and the survival of the human populations which live beside them, it is also essential for the survival of birds.

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